

## PATENT ABSTRACTS OF JAPAN

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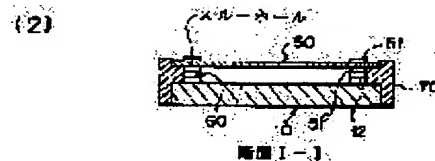
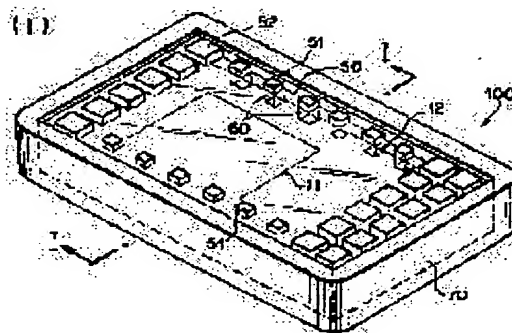
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## (54) CHIP-SIZED PACKAGE FOR IMAGE PICKUP DEVICE

## (57)Abstract:

PROBLEM TO BE SOLVED: To further reduce the external dimensions of a chip-sized package for image pickup devices.

SOLUTION: An image pickup device 10 contains an image pickup region 11 and a plurality of pads 12 for external wiring for outputting image signals representing images picked up in the image pickup region 11. A transparent hard substrate 50 has inside pads 51' for external drawing formed on the side opposed to the image pickup device 10, in positions corresponding to the pads 12 for external wiring on the image pickup device 10, respectively. The transparent hard substrate 50 has outside pads 51 for external drawing formed on the opposite side. The corresponding pads for external drawing are connected with each other through holes. The image pickup device 10 and the transparent hard substrate 50 are opposed to each other with bumps in between, and their peripheral portions are sealed with a sealing member 70 such as resin.



## LEGAL STATUS

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**CLAIMS**

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[Claim(s)]

[Claim 1] In the chip-size package equipped with the image sensor which has two or more pads for external wiring for outputting the picture signal showing an image pick-up field and the picturized image outside The pad for inside side external drawers is prepared in the part which counters said each pad for external wiring of the field which counters this image sensor in the condition of having been arranged so that said image sensor may be countered, respectively. The transparence hard substrate through which each pads for external drawers which the pad for external surface side external drawers is formed in the part corresponding to said each pad for inside side external drawers, respectively, and correspond mutually about the rear face of this opposed face have flowed by the through hole, It is allotted between said each pad for inside side external drawers, and the pad for external wiring. In the condition of having made said transparence hard substrate and said image sensor countering so that it may have the bump who makes it flowing through between these pads and said each pad for inside external drawers and each pad for external wiring may counter through said bump The chip-size package of the image sensor characterized by for the periphery section of this transparence hard substrate and this image sensor covering the perimeter, and the closure being carried out by the closure member.

[Claim 2] The image sensor which has two or more pads for external wiring for outputting the picture signal showing an image pick-up field and the picturized image outside, Two or more pins for external connection by which the end section is connected to this each pad for external wiring, respectively, and the other end is prolonged toward the method of outside, In the condition of having had the transparence hard substrate arranged so that said image sensor may be countered, and having made said transparence hard substrate and said image sensor countering In the chip-size package in which the periphery of this transparence hard substrate and an image sensor covered

the perimeter except for the part which said each pin for external connection passes, and the closure was carried out by the closure member The chip-size package of the image sensor characterized by turning the part projected from said closure member of each of said pin for external connection to the method of outside inside, and coming to turn it up.

[Claim 3] The chip-size package of the image sensor according to claim 1 or 2 characterized by said transparence hard substrate being a glass substrate.

[Claim 4] It is the chip-size package of an image sensor given in any 1 term among claims 1-3 characterized by containing the component which prevents infrared transparency to said transparence hard substrate.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the chip-size package of an image sensor.

[0002]

[Description of the Prior Art] The thing as conventionally shown in drawing 2 as an image sensor is known. The image sensor of illustration is the configuration equipped with two or more pads 12 for external wiring for outputting the picture signal showing the image picturized in the image pick-up field 11 where many optoelectric transducers which change into a picture signal in photoelectricity the light which carried out incidence were arranged, and this image pick-up field 11 to external picture reproducer etc.

[0003] by the way, in the state of a simple substance (bare chip), from viewpoints, such as oxidation of a pad 12, and protection of the image pick-up field 11, since the handling is difficult, generally such an image sensor is shown in drawing 9 -- as -- a chip-size package -- it is-izing and dealt with. Two or more pins 21 for external connection by which, as for this chip-size package 20, the end section is connected with an image sensor 10 through a bump 25 at each pad 12 for external wiring of an image sensor 10, respectively, and the other end is prolonged toward the method of outside (external terminal), In the condition of having had the transparence hard substrates 23, such as a glass substrate which also has the function of the infrared cut filter arranged so that an image sensor 10 may be countered, and having made this transparence hard substrate 23 and image sensor 10 countering The periphery of the transparence hard substrate 23 and an image sensor 10 covers the perimeter except for the part which each pin 21 for external connection passes, and the closure is carried out by the closure member 22. According to this chip-size package 20, oxidation of a pad 12 can be prevented, and it

can protect, securing the incidence of the image to the image pick-up field 11, and that handling can be made easy.

[0004]

[Problem(s) to be Solved by the Invention] By the way, since many pins 21 for external connection have jutted out greatly the chip-size package mentioned above toward the method of outside so that it may be understood also from illustration, the space which this package 20 occupies is very big. For this reason, in the equipment which held component parts, such as a hand held camera, a camera for a monitor, and an electronic endoscope, in smaller space, for example, and aims at the miniaturization of a whole configuration, it is difficult to use the package which occupies such big space.

[0005] Then, fixing a direct bare chip to each equipment, such as an electronic endoscope, is performed, without using such a package in such equipment.

[0006] Although drawing 10 is the example, it carries out die bond of the bare chip 10 to the case 30 of the body of equipment, carries out wire bonding to the pin 31 for connection to which the connection 33 of equipment was connected by the wire 32, and is carrying out the resin seal of these.

[0007] However, if it is when it becomes what has the effect large when it mounts a bare chip in equipment directly in this way which it has on the quality of the whole equipment by the quality of this process to mount and the fault of a chip is detected in the inspection after equipment completion, exchange of the chip concerned is not easy.

[0008] This invention is made in view of the above-mentioned situation, and it aims at offering the chip-size package of the image sensor which miniaturized the outer-diameter configuration more.

[0009]

[Means for Solving the Problem] The chip-size package of the 1st image sensor of this invention does not have the pin for external connection which spreads in the method of outside in an image pick-up side and abbreviation parallel, but is characterized by forming the pad for external wiring, and the flowing pad for external drawers on the front face of an image sensor and the transparence hard substrate which counters.

[0010] Namely, the chip-size package of the 1st image sensor of this invention In the chip-size package equipped with the image sensor which has two or more pads for external wiring for outputting the picture signal showing an image pick-up field and the picturized image outside The pad for inside side external drawers is prepared in the part which counters said each pad for external wiring of the field which counters this image sensor in the condition of having been arranged so that said image sensor may be countered, respectively. The transparence hard substrate through which each pads for

external drawers which the pad for external surface side external drawers is formed in the part corresponding to said each pad for inside side external drawers, respectively, and correspond mutually about the rear face of this opposed face have flowed by the through hole etc., It is allotted between said each pad for inside side external drawers, and the pad for external wiring. In the condition of having made said transparence hard substrate and said image sensor countering so that it may have the bump who makes it flowing through between these pads and said each pad for inside side external drawers and each pad for external wiring may counter through said bump It is characterized by for the periphery section of this transparence hard substrate and this image sensor covering the perimeter, and the closure being carried out by closure members, such as resin.

[0011] Here, as for an image sensor, it is desirable for an image pick-up field and two or more pads for external wiring to be in the same field. When making the pad for inside side external drawers, and the pad for external wiring counter through a bump, it is because these can also be made to counter naturally if an image sensor and a transparence hard substrate are made to counter. Also in the following invention, it is the same.

[0012] In addition, it cannot be overemphasized that the pad for inside side external drawers, the pad for external surface side external drawers, and a bump need the thing of an image pick-up field formed out of range.

[0013] Moreover, as for the above-mentioned transparence hard substrate, it is desirable that it is a glass substrate, and it is desirable that it is a thing containing the component which prevents infrared transparency. Also in the following invention, it is the same.

[0014] In addition, the flow between the pad for inside side external drawers and the pad for external surface side external drawers is good by not the mind limited to that which is not necessarily called at a through hole but methods other than this.

[0015] The chip-size package of the 2nd image sensor of this invention is characterized by turning up the pin for external connection which spreads in the method of outside in an image pick-up side and abbreviation parallel inside.

[0016] Namely, the chip-size package of the 2nd image sensor of this invention The image sensor which has two or more pads for external wiring for outputting the picture signal showing an image pick-up field and the picturized image outside, Two or more pins for external connection by which the end section is connected to this each pad for external wiring, respectively, and the other end is prolonged toward the method of outside, In the condition of having had the transparence hard substrate arranged so

that said image sensor may be countered, and having made said transparency hard substrate and said image sensor countering In the chip-size package in which the periphery of this transparency hard substrate and an image sensor covered the perimeter except for the part which said each pin for external connection passes, and the closure was carried out by the closure member It is characterized by turning the part projected from said closure member of each of said pin for external connection to the method of outside inside, and coming to turn it up.

[0017] In addition, it cannot be overemphasized that the die length etc. is set up so that the part in which each pin for external connection was turned up by the inside may not reach within the limits of an image pick-up field. In addition, such a setup is unnecessary when this cuff is turned up by the near field where the image pick-up side of an image sensor does not exist.

[0018]

[Effect of the Invention] According to the chip-size package of the 1st image sensor of this invention, on the front face of an image sensor and the transparency hard substrate which counters By having formed the pad for external surface side external drawers which flows in the pad for external wiring through the pad for inside side external drawers, and a bump the pin for external connection which spreads in the method of outside from the side of an image pick-up side -- it is not necessary to provide -- the magnitude of a package -- within the limits of the outer-diameter dimension of a closure member -- \*\*\*\*\* -- things are made and it becomes possible to realize a miniaturization.

[0019] Moreover, since it can provide not as a bare chip but as a package, it becomes easier than the case where the handling is a bare chip.

[0020] the configuration which turned up the part which was projected to the method of outside from the closure member of the pin for external connection which spreads in the method of outside from the side of an image pick-up side according to the chip-size package of the 2nd image sensor of this invention to the inside, i.e., image sensor, side -- the outermost part of this pin for external connection -- the outer-diameter dimension of a closure member, and abbreviation -- it can be made the same and it becomes possible to realize the miniaturization of a package.

[0021]

[Embodiment of the Invention] Hereafter, the gestalt of concrete operation of the chip-size package of the image sensor of this invention is explained in detail using a drawing.

[0022] Drawing in which drawing 2 shows the bare chip of an image sensor, and

drawing 1 are the perspective view which used this image sensor 10 and in which showing 1 operation gestalt of the 1st chip-size package of this invention, and its I-I line sectional view. Furthermore, drawing 3 is the chip-size package 100 shown in drawing 1. It is drawing showing the detail of the glass substrate 50 which has the infrared cut function which is one component.

[0023] The image sensor 10 shown in drawing 1 is the configuration equipped with two or more pads 12 for external wiring for outputting the picture signal showing the image picturized in the image pick-up field 11 where many optoelectric transducers which change into a picture signal in photoelectricity the light which carried out incidence were arranged, and this image pick-up field 11 to external picture reproducer etc.

[0024] Moreover, the transparence hard substrate 50 shown in drawing 3 is a glass substrate of the transparence containing the component which prevents infrared transparency, and pad 51' for inside side external drawers (A1-A18) is formed in each pad 12 for external wiring of an image sensor 10 of the opposed face (refer to drawing 3 (2)), and the part which counters in the condition of having countered the image sensor 10, respectively. Furthermore, the same pad 52' for inside side bump connection of a number as this pad 51' for inside side external drawers (B1-B18) is formed in the outside of the field (a broken line illustrates) which counters the image pick-up field 11 of an image sensor 10.

[0025] Here B13 of A1 of pad 51' for inside side external drawers, B1 of pad 52' for inside side bump connection, A8 of pad 51' for inside side external drawers, A9 of B7 of pad 52' for inside side bump connection, and pad 51' for inside side external drawers, and pad 52' for inside side bump connection, A10 of pad 51' for inside side external drawers A17 of pad 51' B6 of pad 52' for inside side bump connection, and for inside side external drawers B12 of pad 52' for inside side bump connection, A18 of pad 51' for inside side external drawers B18 of pad 52' for inside side bump connection It overlaps, respectively. Therefore, a flow is accepted between these pads for inside side external drawers, and the pad for inside side bump connection.

[0026] On the other hand, B14 of A3 of pad 51' for inside side external drawers, A4 of B3 of pad 52' for inside side bump connection, and pad 51' for inside side external drawers, and pad 52' for inside side bump connection, B15 of A5 of pad 51' for inside side external drawers, and pad 52' for inside side bump connection, A12 of pad 51' for inside side external drawers A13 of pad 51' B4 of pad 52' for inside side bump connection, and for inside side external drawers B17 of pad 52' for inside side bump connection, A14 of pad 51' for inside side external drawers B16 of pad 52' for inside side bump connection It has flowed by the printed circuit in the opposed face with the image sensor 10. In addition,

this printed circuit is also formed in the outside of the field (a broken line illustrates) 53 which counters the image pick-up field 11 of an image sensor 10.

[0027] moreover, in the field (the field of the side which has not countered an image sensor 10; refer to drawing 3 (1)) of the outside of this transparence hard substrate 50 Into the part corresponding to each pad 51 for inside side external drawers ' formed in the opposed face (refer to drawing 3 (2)), and pad 52' for inside side bump connection The pad 51 (A1-A18) for external surface side external drawers and the pad 52 (B1-B18) for external surface side bump connection are formed, respectively. And 52 A9 of 51 padA1 for external surface side external drawers, 51 52 padB1 for external surface side bump connection and the padA8 for external surface side external drawers, 52 padB7 for external surface side bump connection, and the pad 51 for external surface side external drawers and the padB13 for external surface side bump connection, 51 padA10 for external surface side external drawers B6 of the pad 52 for external surface side bump connection, and 51 padA17 for external surface side external drawers 52 padB12 for external surface side bump connection, 51 padA18 for external surface side external drawers 52 padB18 for external surface side bump connection It overlaps, respectively. 51 padA2 for external surface side external drawers, 51 B-2 of the pad 52 for external surface side bump connection and the padA6 for external surface side external drawers, 51 52 padB9 for external surface side bump connection and the padA7 for external surface side external drawers, and 52 padB8 for external surface side bump connection, 51 padA11 for external surface side external drawers B5 of the pad 52 for external surface side bump connection, and 51 padA15 for external surface side external drawers 52 padB10 for external surface side bump connection, 51 padA16 for external surface side external drawers 52 padB11 for external surface side bump connection It has flowed by the printed circuit in the field (refer to drawing 3 (1)). In addition, this printed circuit is also formed in the outside of the field 53 which counters the image pick-up field 11 of an image sensor 10.

[0028] Furthermore, this transparence hard substrate 50 has flowed through the notations (A1-A18) to which it corresponds between pad 51' for inside side external drawers, and the pad 51 for external surface side external drawers by the through hole. Similarly, it has flowed through the notations (B1-B18) to which it corresponds between pad 52' for inside side bump connection, and the pad 52 for external surface side bump connection by the through hole. In addition, the flow between these is good also by methods other than a through hole.

[0029] And chip-size package 100 of this operation gestalt shown in drawing 1 Such an image sensor 10 and the transparence hard substrate 50 be made to counter through

the conductive bump 60 between each pad 12 for external wiring , and pad 51' for inside side external drawers , and the perimeter be covered in the condition in both the periphery section of an image sensor 10 and the transparence hard substrate 50 , and it close by the closure members 70 , such as resin , and be constituted (refer to drawing 1 ) .

[0030] Next, chip-size package 100 of this operation gestalt An operation and effectiveness are explained.

[0031] Incidence is carried out to the image pick-up field 11 of an image sensor 10, and in the image pick-up field 11, the light which supported the image which penetrated the transparence hard substrate 50 carries out photo electric conversion of this light that carried out incidence for every pixel, and acquires the picture signal corresponding to this image. In addition, the image pick-up field 11 can be made to carry out incidence of the light which supported the above-mentioned image, since neither the pad nor the printed circuit is formed in the field which counters the image pick-up field 11 of the transparence hard substrate 50, without being interrupted by them.

[0032] The picture signal by which photo electric conversion was carried out reaches pad 51' for inside side external drawers formed in the transparence hard substrate 50 through the pad 12 for external wiring, and the bump 60. It is A9 among [ A1 and A8 ] pad 51' for inside side external drawers, A10, A17, and A18 here. B1, B7 and B13 of the pad 52 for external surface side bump connection which reached and overlapped the pad 51 for external surface side external drawers through the through hole, B6, B12, and B18 It reaches. Moreover, A3, A4, A5, A12, A13, and A14 A printed circuit is led and it is B3 and B14 of pad 52' for inside side bump connection, B15, B4, B17, and B16. It reaches, a through hole is led and it is B3 and B14 of the pad 52 for external surface side bump connection, B15, B4, B17, and B16. It reaches.

[0033] It is A2, A6, A7, A11, A15, and A16 further again. A through hole is led and it is A2, A6, A7 and A11 of the pad 51 for external surface side external drawers, A15, and A16. It reaches, a printed circuit is led and it is B-2 of the pad 52 for external surface side bump connection, B9 and B8, B5, B10, and B11. It reaches.

[0034] thus, chip-size package 100 of the image sensor of this operation gestalt the pin for external connection which will spread greatly in a method of outside like before if it depends -- it is not necessary to provide -- the magnitude of a package -- within the limits of the outer-diameter dimension of the closure member 70 -- \*\*\*\*\* -- things are made and it becomes possible to realize a miniaturization. Moreover, since it can provide not as a bare chip but as a package, it becomes easier than the case where the handling is a bare chip.

[0035] In addition, it is a package 100 in this way. In actually taking out the picture

signal which conducted current to the outside surface to other equipments, for example, picture reproducer etc. this package 100 it is shown in the transparence hard substrate 50 at drawing 4 -- the time -- flexible printed circuit (FPC) 200 As a pad 201 (C1-C18) is made equivalent to each pad 52 (B1-B18) for external surface side bump connection, respectively and it is shown among each of these pads at drawing 5 , he is the conductive connection bump 300. What is necessary is to mind and just to connect.

[0036] Moreover, this FPC200 Although the pad 201 (C1-C18) is formed in that rear face (a package 100 and the field which counters; refer to drawing 4 (2)) C1-C12 \*\*\*\* -- the transparence hard substrate 50 -- the same -- a through hole -- leading -- the still more nearly same pad 201 also as a front face (it is referring to [ of the opposite side ] field; drawing 4 (1) to a package 100 and the field which counters) It is formed. [ among these, ] And in a rear face, they are C13 - C18. Pad 201 Printed circuit 203 connected It is formed and, on the other hand, is C1-C12 in a front face. Pad 201 Printed circuit 202 connected It is formed.

[0037] In addition, FPC200 It also sets, and the image pick-up field 11 can be made to carry out incidence of the light which supported the above-mentioned image, since neither the pad 201 (C1-C18) nor the printed circuit is formed in the field 210 which counters the image pick-up field 11 (field shown with a broken line), without being interrupted by them.

[0038] Drawing 6 is the sectional view showing the I-I line cross section expressed to (1) perspective view, (2) top views, and (3) perspective views showing 1 operation gestalt of the 2nd chip-size package of this invention.

[0039] The image sensor 10 which showed the chip-size package of illustration to drawing 2 (bare chip), Two or more pins 21 for external connection by which the end section is connected to each pad 12 for external wiring of an image sensor 10 through the conductive bump 25, respectively, and the other end is prolonged toward the method of outside, In the condition of having had the transparence hard substrate 23 arranged so that an image sensor 10 may be countered, and having made the transparence hard substrate 23 and the image sensor 10 countering The periphery of the transparence hard substrate 23 and an image sensor 10 covers the perimeter except for the part which each pin 21 for external connection passes, and the closure is carried out by the closure members 22, such as resin. The part projected from the closure member 22 of each pin 21 for external connection to the method of outside is the configuration turned up along with the transparence hard substrate 23. And that die length etc. is set up so that the part in which each of this pin 21 for external connection was turned up by that inside may not reach within the limits of the image pick-up field 11 of an image sensor

10.

[0040] thus, the outermost part of the pin 21 for external connection which spreads in the method of outside from the side of an image pick-up side according to the constituted chip-size package -- the outer-diameter dimension of the closure member 22, and abbreviation -- it can be made the same and it becomes possible to realize the miniaturization of a package.

[0041] Although the thing of the operation gestalt which showed the chip-size package shown in drawing 7 to drawing 6 , and the fundamental configuration are the same, the direction of a clinch of the part projected from the closure member 22 of each pin 21 for external connection to the method of outside is not what met the transparence hard substrate 23, and is different in the point of having met the tooth back of an image sensor 10. In addition, since an operation and effectiveness are the same as that of the thing of the operation gestalt shown in drawing 6 , explanation is omitted.

[0042] The chip-size package shown in drawing 8 is the configuration which combined the thing of the operation gestalt shown in the thing and drawing 7 of the operation gestalt shown in drawing 6 , and are what met the transparence hard substrate 23 by turns in the direction of a clinch of the part projected from the closure member 22 of the pin 21 for external connection to the method of outside, and the configuration of having met the tooth back of an image sensor 10. In addition, since an operation and effectiveness are the same as that of the thing of the operation gestalt shown in drawing 6 , explanation is omitted.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] The perspective view showing 1 operation gestalt of the 1st chip-size package of this invention using the image sensor shown in drawing 2 , and its I-I line sectional view

[Drawing 2] Drawing showing the bare chip of an image sensor

[Drawing 3] Chip-size package 100 shown in drawing 1 Drawing showing the detail of the glass substrate 50 which has the infrared cut function which is one component

[Drawing 4] Drawing showing an example of the flexible printed circuit (FPC) connected to the chip-size package of the operation gestalt shown in drawing 1

[Drawing 5] He is the conductive connection bump 300 about a chip-size package and FPC. Drawing for minding and explaining the condition of connecting

[Drawing 6] Drawing showing 1 operation gestalt of the 2nd chip-size package of this invention

[Drawing 7] Drawing showing other operation gestalten of the 2nd chip-size package of this invention

[Drawing 8] Drawing showing other operation gestalten of the 2nd chip-size package of this invention

[Drawing 9] Drawing showing the conventional common chip-size package

[Drawing 10] Drawing showing the mode which fixed the bare chip of an image sensor directly on the body of equipment

**[Description of Notations]**

10 Image Sensor

11 Image Pick-up Field

12 Pad for External Wiring

50 Transparence Hard Substrate

51' Pad for inside side external drawers

51 Pad for External Surface Side External Drawers

52' Pad for inside side bump connection

52 Pad for External Surface Side Bump Connection

60 Bump

70 Closure Member

100 Chip-size Package

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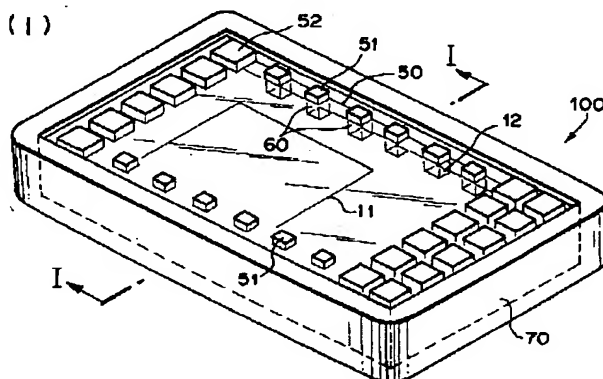
(54) 【発明の名称】 撮像素子のチップサイズパッケージ

(57) 【要約】

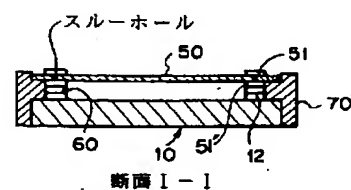
【課題】 撮像素子のチップサイズパッケージの外径形状をより小型化する。

【解決手段】 撮像領域11とこの撮像領域11で撮像された画像を表す画像信号を出力するための複数の外部配線用パッド12とを備えた撮像素子10と、撮像素子10に対向した状態において、撮像素子10の各外部配線用パッド12と対向する部分にそれぞれ内面側外部引出用パッド51'が形成され、反対側の面に外面側外部引出用パッド51が形成され、対応する両外部引出用パッド同士がスルーホールで導通された透明硬質基板50とを、バンプ60を介して対向させ、これらの周縁部を樹脂等の封止部材70により封止する。

(1)



(2)



## 【特許請求の範囲】

【請求項1】 撮像領域と撮像された画像を表す画像信号を外部に出力するための複数の外部配線用パッドとを有する撮像素子を備えたチップサイズパッケージにおいて、

前記撮像素子に対向するように配置された状態において、該撮像素子に対向する面の前記各外部配線用パッドに対向する部分にそれぞれ内面側外部引出用パッドが設けられ、該対向面の裏面について前記各内面側外部引出用パッドに対応する部分にそれぞれ外面側外部引出用パッドが形成され、互いに対応する各外部引出用パッド同士がスルーホールにより導通されている透明硬質基板と、

前記各内面側外部引出用パッドと外部配線用パッドとの間に配されて、これらのパッド間を導通せしめるバンプとを備え、

前記各内面側外部引出用パッドと各外部配線用パッドとが前記バンプを介して対向するように前記透明硬質基板と前記撮像素子とを対向せしめた状態で、該透明硬質基板と該撮像素子との周縁部が全周に亘って封止部材により封止されていることを特徴とする撮像素子のチップサイズパッケージ。

【請求項2】 撮像領域と撮像された画像を表す画像信号を外部に出力するための複数の外部配線用パッドとを有する撮像素子と、一端部が該各外部配線用パッドにそれぞれ接続され、他端部が外方に向かって延びる複数の外部接続用ピンと、前記撮像素子に対向するように配置された透明硬質基板とを備え、前記透明硬質基板と前記撮像素子とを対向せしめた状態で、該透明硬質基板と撮像素子との周縁部が前記各外部接続用ピンの通過する部分を除いて全周に亘って封止部材により封止されたチップサイズパッケージにおいて、

前記各外部接続用ピンの前記封止部材から外方に突出した部分を、内側に向けて折り返してなることを特徴とする撮像素子のチップサイズパッケージ。

【請求項3】 前記透明硬質基板がガラス基板であることを特徴とする請求項1または2記載の撮像素子のチップサイズパッケージ。

【請求項4】 前記透明硬質基板に赤外線透過を阻止する成分を含有していることを特徴とする請求項1から3のうちいずれか1項に記載の撮像素子のチップサイズパッケージ。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は撮像素子のチップサイズパッケージに関するものである。

## 【0002】

【従来の技術】従来より撮像素子として図2に示すようなものが知られている。図示の撮像素子は、入射した光を光電的に画像信号に変換する光電変換素子が多数配列

された撮像領域11とこの撮像領域11で撮像された画像を表す画像信号を外部の画像再生装置等に出力するための複数の外部配線用パッド12とを備えた構成である。

【0003】ところでこのような撮像素子は、単体の状態（ベアチップ）ではパッド12の酸化、撮像領域11の保護等の観点からその取扱いが難しいため、一般には図9に示すようにチップサイズパッケージ化されて取り扱われている。このチップサイズパッケージ20は、撮像素子10と、一端部が撮像素子10の各外部配線用パッド12にバンプ25を介してそれぞれ接続され、他端部が外方に向かって延びる複数の外部接続用ピン（外部端子）21と、撮像素子10に対向するように配置された赤外線カットフィルターの機能をも有するガラス基板等の透明硬質基板23とを備え、この透明硬質基板23と撮像素子10とを対向せしめた状態で、透明硬質基板23と撮像素子10との周縁部が各外部接続用ピン21の通過する部分を除いて全周に亘って封止部材22により封止されたものである。このチップサイズパッケージ20によれば、パッド12の酸化を防止し、また撮像領域11への画像の入射を確保しつつ保護することができ、その取扱いを容易なものとすることができる。

## 【0004】

【発明が解決しようとする課題】ところで上述したチップサイズパッケージは図示からも解されるように、多数の外部接続用ピン21が外方に向かって大きく張り出しているため、このパッケージ20が占める空間は非常に大きなものとなっている。このため例えばハンディカメラ、監視用カメラ、電子内視鏡等、構成部品をより小さな空間に収容して全体形状の小型化を目指している装置においては、このような大きな空間を占有するパッケージを使用することは困難になっている。

【0005】そこでこのような装置においてはこのようなパッケージを用いずに、電子内視鏡等の各装置に直接ベアチップを固定することが行なわれている。

【0006】図10はその一例であるが、装置本体のケース30にベアチップ10をダイボンドし、ワイヤー32により装置の結線33が接続された接続用ピン31とワイヤーボンディングし、これらを樹脂封止している。

【0007】しかし、このようにベアチップを直接に装置に実装する場合、この実装する工程の良否により装置全体の品質に与える影響が大きいものとなり、また装置完成後の検査においてチップの不具合が検出された場合にあっては、当該チップの交換作業は容易なものではない。

【0008】本発明は上記事情に鑑みなされたものであって、その外径形状をより小型化した撮像素子のチップサイズパッケージを提供することを目的とするものである。

## 【0009】

【課題を解決するための手段】本発明の第1の撮像素子

のチップサイズパッケージは、撮像面と略平行で外方に拡がる外部接続用ピンを有さず、撮像素子と対向する透明硬質基板の表面上に、外部配線用パッドと導通する外部引出用パッドを形成したことを特徴とするものである。

【0010】すなわち本発明の第1の撮像素子のチップサイズパッケージは、撮像領域と撮像された画像を表す画像信号を外部に出力するための複数の外部配線用パッドとを有する撮像素子を備えたチップサイズパッケージにおいて、前記撮像素子に対向するように配置された状態において、該撮像素子に対向する面の前記各外部配線用パッドに対向する部分にそれぞれ内面側外部引出用パッドが設けられ、該対向面の裏面について前記各内面側外部引出用パッドに対応する部分にそれぞれ外面側外部引出用パッドが形成され、互いに対応する各外部引出用パッド同士がスルーホール等により導通されている透明硬質基板と、前記各内面側外部引出用パッドと外部配線用パッドとの間に配されて、これらのパッド間を導通せしめるバンプとを備え、前記各内面側外部引出用パッドと各外部配線用パッドとが前記バンプを介して対向するように前記透明硬質基板と前記撮像素子とを対向せしめた状態で、該透明硬質基板と該撮像素子との周縁部が全周に亘って樹脂等の封止部材により封止されていることを特徴とするものである。

【0011】ここで、撮像素子は、撮像領域と複数の外部配線用パッドとが同一面内にあることが望ましい。内面側外部引出用パッドと外部配線用パッドとをバンプを介して対向させるとき、撮像素子と透明硬質基板とを対向させればこれらも当然に対向させることができるからである。以下の発明においても同様である。

【0012】なお、内面側外部引出用パッド、外面側外部引出用パッドおよびバンプは、撮像領域の範囲外に形成されることが必要であることはいうまでもない。

【0013】また上記透明硬質基板はガラス基板であるのが望ましく、また赤外線透過を阻止する成分を含有しているものであることが望ましい。以下の発明においても同様である。

【0014】なお内面側外部引出用パッドと外面側外部引出用パッドとの間の導通は必ずしもスルーホールによるものに限る意ではなくこれ以外の方式によってもよい。

【0015】本発明の第2の撮像素子のチップサイズパッケージは、撮像面と略平行で外方に拡がる外部接続用ピンを内側に折り返したことを特徴とするものである。

【0016】すなわち本発明の第2の撮像素子のチップサイズパッケージは、撮像領域と撮像された画像を表す画像信号を外部に出力するための複数の外部配線用パッドとを有する撮像素子と、一端部が該各外部配線用パッドにそれぞれ接続され、他端部が外方に向かって延びる複数の外部接続用ピンと、前記撮像素子に対向するよう

に配置された透明硬質基板とを備え、前記透明硬質基板と前記撮像素子とを対向せしめた状態で、該透明硬質基板と撮像素子との周縁が前記各外部接続用ピンの通過する部分を除いて全周に亘って封止部材により封止されたチップサイズパッケージにおいて、前記各外部接続用ピンの前記封止部材から外方に突出した部分を、内側に向けて折り返してなることを特徴とするものである。

【0017】なお各外部接続用ピンは、その内側に折り返された部分が撮像領域の範囲内に到達しないように、その長さ等が設定されることはいうまでもない。なおこの折返しは撮像素子の、撮像面が存在しない側の面に折り返される場合はそのような設定は不要である。

【0018】

【発明の効果】本発明の第1の撮像素子のチップサイズパッケージによれば、撮像素子と対向する透明硬質基板の表面上に、内面側外部引出用パッドとバンプとを介して外部配線用パッドに導通する外面側外部引出用パッドを形成したことにより、撮像面の側方から外方に拡がる外部接続用ピンを具備する必要がなく、パッケージの大きさを封止部材の外径寸法の範囲内に略収めることができ、小型化を実現することが可能となる。

【0019】また、ベアチップではなくパッケージとして提供できるため、その取扱いがベアチップの場合よりも容易になる。

【0020】本発明の第2の撮像素子のチップサイズパッケージによれば、撮像面の側方から外方に拡がる外部接続用ピンの、封止部材から外方に突出した部分を内側に折り返した構成により、この外部接続用ピンの最外部を封止部材の外径寸法と略同じにすることができ、パッケージの小型化を実現することが可能となる。

【0021】

【発明の実施の形態】以下、本発明の撮像素子のチップサイズパッケージの具体的な実施の形態について図面を用いて詳しく説明する。

【0022】図2は撮像素子のベアチップを示す図、図1はこの撮像素子10を用いた、本発明の第1のチップサイズパッケージの一実施形態を示す斜視図およびその1-1線断面図である。さらに図3は図1に示したチップサイズパッケージ100の一構成要素である赤外線カット機能を有するガラス基板50の詳細を示す図である。

【0023】図1に示した撮像素子10は、入射した光を光電的に画像信号に変換する光電変換素子が多数配列された撮像領域11とこの撮像領域11で撮像された画像を表す画像信号を外部の画像再生装置等に出力するための複数の外部配線用パッド12とを備えた構成である。

【0024】また図3に示した透明硬質基板50は赤外線透過を阻止する成分を含有した透明のガラス基板であり、撮像素子10に対向した状態において、その対向面（図3（2）参照）の、撮像素子10の各外部配線用パッ

ド12と対向する部分にそれぞれ内面側外部引出用パッド51' (A1~A18) が形成されている。さらに、この内面側外部引出用パッド51' と同じ数の内面側バンパ接続用パッド52' (B1~B18) が、撮像素子10の撮像領域11に対向する領域(破線で図示)の外側に形成されている。

【0025】ここで、内面側外部引出用パッド51' のA1と内面側バンパ接続用パッド52' のB1、内面側外部引出用パッド51' のA8と内面側バンパ接続用パッド52' のB7、内面側外部引出用パッド51' のA9と内面側バンパ接続用パッド52' のB13、内面側外部引出用パッド51' のA10と内面側バンパ接続用パッド52' のB6、内面側外部引出用パッド51' のA17と内面側バンパ接続用パッド52' のB12、内面側外部引出用パッド51' のA18と内面側バンパ接続用パッド52' のB18はそれぞれ重複している。したがってこれらの内面側外部引出用パッドと内面側バンパ接続用パッドとの間では導通が認められる。

【0026】一方、内面側外部引出用パッド51' のA3と内面側バンパ接続用パッド52' のB3、内面側外部引出用パッド51' のA4と内面側バンパ接続用パッド52' のB14、内面側外部引出用パッド51' のA5と内面側バンパ接続用パッド52' のB15、内面側外部引出用パッド51' のA12と内面側バンパ接続用パッド52' のB4、内面側外部引出用パッド51' のA13と内面側バンパ接続用パッド52' のB17、内面側外部引出用パッド51' のA14と内面側バンパ接続用パッド52' のB16は、その撮像素子10との対向面内においてプリント配線により導通されている。なおこのプリント配線も、撮像素子10の撮像領域11に対向する領域(破線で図示)53の外側に形成されている。

【0027】またこの透明硬質基板50の外側の面(撮像素子10に対向していない側の面; 図3(1)参照)には、その対向面(図3(2)参照)に形成された各内面側外部引出用パッド51' および内面側バンパ接続用パッド52' に対応する部分に、外面側外部引出用パッド51(A1~A18) および外面側バンパ接続用パッド52(B1~B18) がそれぞれ形成されている。そして外面側外部引出用パッド51のA1と外面側バンパ接続用パッド52のB1、外面側外部引出用パッド51のA8と外面側バンパ接続用パッド52のB7、外面側外部引出用パッド51のA9と外面側バンパ接続用パッド52のB13、外面側外部引出用パッド51のA10と外面側バンパ接続用パッド52のB6、外面側外部引出用パッド51のA17と外面側バンパ接続用パッド52のB12、外面側外部引出用パッド51のA18と外面側バンパ接続用パッド52のB18はそれぞれ重複しており、外面側外部引出用パッド51のA2と外面側バンパ接続用パッド52のB2、外面側外部引出用パッド51のA6と外面側バンパ接続用パッド52のB9、外面側外部引出用パッド51のA7と外面側バンパ接続用パッド52のB8、外面側外部引出用パッド51のA11と外面側バンパ接続用パッド52のB5、外面側外部引出用パッド51のA15と外面側バンパ接続用パッド

52のB10、外面側外部引出用パッド51のA16と外面側バンパ接続用パッド52のB11は、その面内においてプリント配線により導通されている(図3(1)参照)。なおこのプリント配線も、撮像素子10の撮像領域11に対向する領域53の外側に形成されている。

【0028】さらに、この透明硬質基板50は、内面側外部引出用パッド51' と外面側外部引出用パッド51との間の対応する記号(A1~A18)同士は、スルーホールにより導通されている。同様に、内面側バンパ接続用パッド52' と外面側バンパ接続用パッド52との間の対応する記号(B1~B18)同士は、スルーホールにより導通されている。なお、これらの間の導通はスルーホール以外の方式によってもよい。

【0029】そして図1に示す本実施形態のチップサイズパッケージ100は、このような撮像素子10と透明硬質基板50とを、各外部配線用パッド12と内面側外部引出用パッド51' との間に導電性のバンパ60を介して対向させ、その状態で撮像素子10と透明硬質基板50との両周縁部を全周に亘って樹脂等の封止部材70により封止して構成されている(図1参照)。

【0030】次に本実施形態のチップサイズパッケージ100の作用、効果について説明する。

【0031】透明硬質基板50を透過した画像を担持した光が撮像素子10の撮像領域11に入射し、撮像領域11ではこの入射した光を画素ごとに光電変換してこの画像に対応する画像信号を取得する。なお、透明硬質基板50の撮像領域11に対向する領域にはパッドやプリント配線が形成されていないため、上記画像を担持した光をそれらに遮られることなく撮像領域11に入射させることができる。

【0032】光電変換された画像信号は外部配線用パッド12、バンパ60を通じて透明硬質基板50に形成された内面側外部引出用パッド51' に達する。ここで内面側外部引出用パッド51' のうちA1、A8、A9、A10、A17、A18はスルーホールを通じて外面側外部引出用パッド51に到達し、重複した外面側バンパ接続用パッド52のB1、B7、B13、B6、B12、B18に到達する。またA3、A4、A5、A12、A13、A14はプリント配線を通じて内面側バンパ接続用パッド52' のB3、B14、B15、B4、B17、B16に到達し、スルーホールを通じて外面側バンパ接続用パッド52のB3、B14、B15、B4、B17、B16に到達する。

【0033】さらにまたA2、A6、A7、A11、A15、A16はスルーホールを通じて外面側外部引出用パッド51のA2、A6、A7、A11、A15、A16に到達し、プリント配線を通じて外面側バンパ接続用パッド52のB2、B9、B8、B5、B10、B11に到達する。

【0034】このように本実施形態の撮像素子のチップサイズパッケージ100によれば、従来のような外方に大きく広がる外部接続用のピンを具備する必要がなく、パッケージの大きさを封止部材70の外径寸法の範囲内に略

収めることができ、小型化を実現することが可能となる。またベアチップではなくパッケージとして提供できるため、その取扱いがベアチップの場合よりも容易になる。

【0035】なお、このようにパッケージ100の外表面に導電された画像信号を実際に他の装置、例えば画像再生装置等に取り出す場合には、このパッケージ100の透明硬質基板50に、図4に示すごとフレキシブルプリント回路(FPC)200を、各外面側バンパ接続用パッド52(B1~B18)にそれぞれパッド201(C1~C18)を対

10 対応させ、これらの各パッド間に図5に示すように導電性の接続バンパ300を介して接続すればよい。

【0036】また、このFPC200は、その裏面(パッケージ100と対向する面;図4(2)参照)にパッド201(C1~C18)が形成されているが、このうちC1~C12には透明硬質基板50と同様に、スルーホールを通じてさらに表面(パッケージ100と対向する面に対して反対側の面;図4(1)参照)にも同じパッド201が形成されている。そして裏面には、C13~C18のパッド201に接

20 続されるプリント配線203が形成され、一方、表面には、C1~C12のパッド201に接続されるプリント配線202が形成されている。

【0037】なおFPC200においても、撮像領域11に対向する領域210(破線で示す領域)にはパッド201(C1~C18)やプリント配線が形成されていないため、上記画像を担持した光をそれらに遮られることなく撮像領域11に入射させることができる。

【0038】図6は本発明の第2のチップサイズパッケージの一実施形態を示す(1)斜視図、(2)平面図および(3)斜視図に表された1-1線断面を示す断面図

30 である。

【0039】図示のチップサイズパッケージは、図2に示した撮像素子(ベアチップ)10と、一端部が撮像素子10の各外部配線用パッド12に導電性のバンパ25を介してそれぞれ接続され、他端部が外方に向かって延びる複数の外部接続用ピン21と、撮像素子10に対向するように配置された透明硬質基板23とを備え、透明硬質基板23と撮像素子10とを対向せしめた状態で、透明硬質基板23と撮像素子10との周縁が各外部接続用ピン21の通過する部分を除いて全周に亘って樹脂等の封止部材22により封止さ

40 され、各外部接続用ピン21の封止部材22から外方に突出した部分が、透明硬質基板23に沿って折り返されている構成である。そしてこの各外部接続用ピン21は、その内側に折り返された部分が撮像素子10の撮像領域11の範囲内に到達しないように、その長さ等が設定されている。

【0040】このように構成されたチップサイズパッケージによれば、撮像面の側方から外方に拡がる外部接続用ピン21の最外部を、封止部材22の外径寸法と略同じにすることができ、パッケージの小型化を実現することが可能となる。

【0041】図7に示したチップサイズパッケージは、図6に示した実施形態のものと基本的な構成は同様であるが、各外部接続用ピン21の封止部材22から外方に突出した部分の折り返し方向が、透明硬質基板23に沿ったものではなく、撮像素子10の背面に沿ったものとした点において相違する。なお、作用、効果は図6に示した実施形態のものと同様であるので説明を省略する。

【0042】図8に示したチップサイズパッケージは、図6に示した実施形態のものと図7に示した実施形態のものとを組み合わせた構成であり、外部接続用ピン21の封止部材22から外方に突出した部分の折り返し方向を交互に、透明硬質基板23に沿ったもの、撮像素子10の背面に沿ったもの、とした構成である。なお、作用、効果は図6に示した実施形態のものと同様であるので説明を省略する。

#### 【図面の簡単な説明】

【図1】図2に示した撮像素子を用いた、本発明の第1のチップサイズパッケージの一実施形態を示す斜視図およびその1-1線断面図

【図2】撮像素子のベアチップを示す図

【図3】図1に示したチップサイズパッケージ100の一構成要素である赤外線カット機能を有するガラス基板50の詳細を示す図

【図4】図1に示した実施形態のチップサイズパッケージに接続されるフレキシブルプリント回路(FPC)の一例を示す図

【図5】チップサイズパッケージとFPCとを導電性の接続バンパ300を介して接続する状態を説明するための図

30 【図6】本発明の第2のチップサイズパッケージの一実施形態を示す図

【図7】本発明の第2のチップサイズパッケージの他の実施形態を示す図

【図8】本発明の第2のチップサイズパッケージの他の実施形態を示す図

【図9】従来の一般的なチップサイズパッケージを示す図

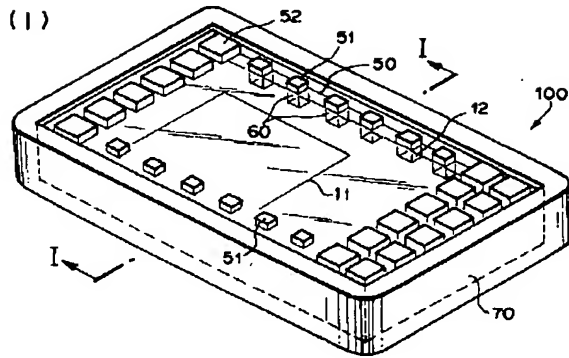
【図10】装置本体に撮像素子のベアチップを直接固定した態様を示す図

#### 【符号の説明】

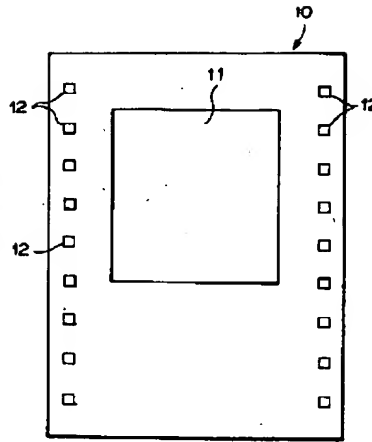
- 10 撮像素子
- 11 撮像領域
- 12 外部配線用パッド
- 50 透明硬質基板
- 51' 内面側外部引出用パッド
- 51 外面側外部引出用パッド
- 52' 内面側バンパ接続用パッド
- 52 外面側バンパ接続用パッド
- 60 バンパ
- 50 70 封止部材

## 100 チップサイズパッケージ

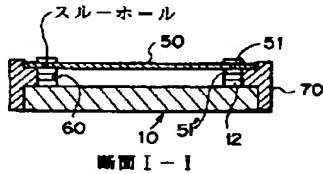
【図1】



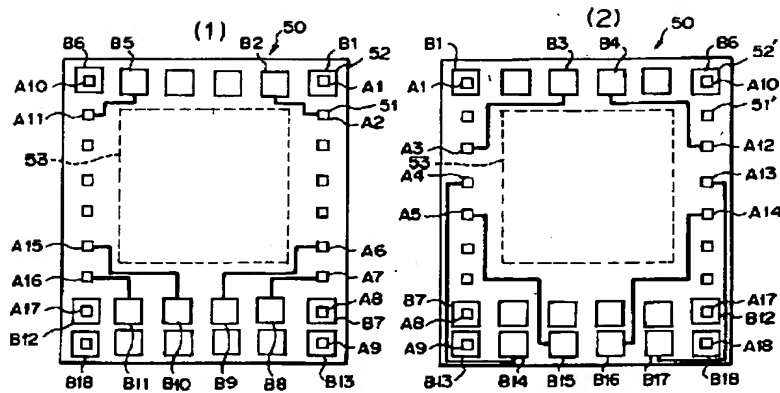
【図2】



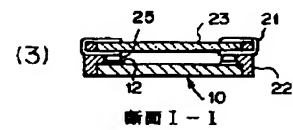
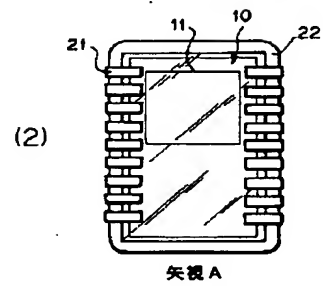
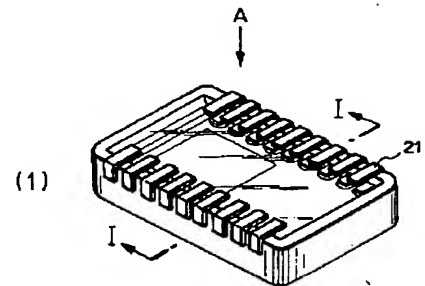
(2)



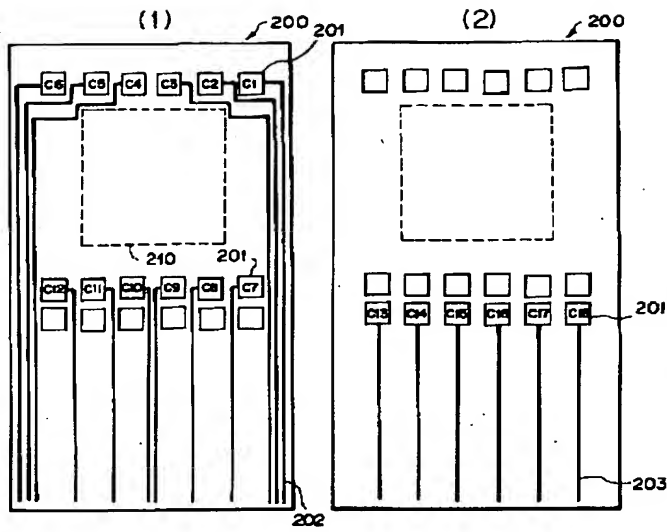
【図3】



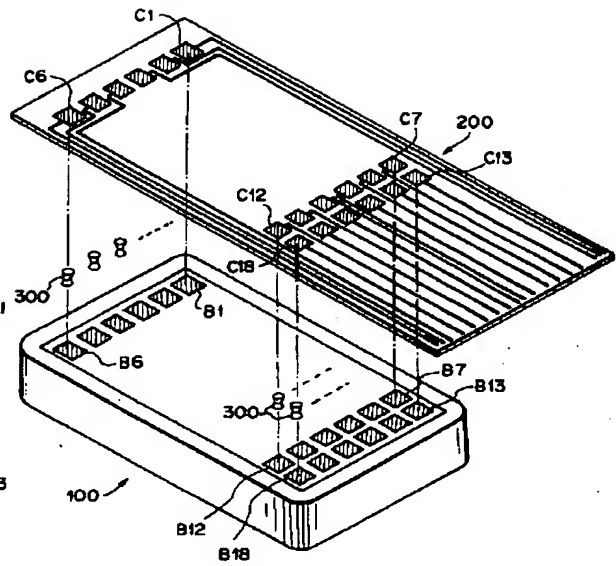
【図6】



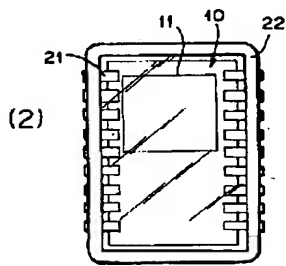
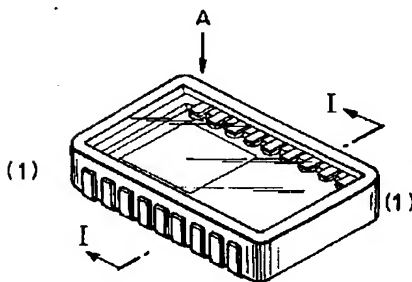
【図 4】



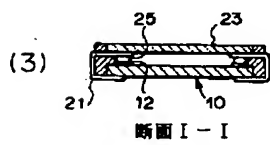
【図 5】



【図 7】

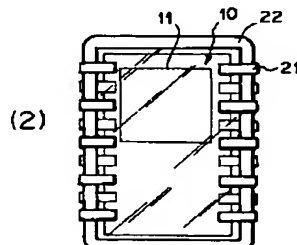
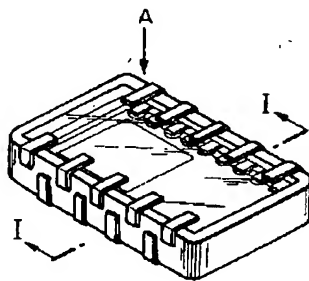


矢視 A

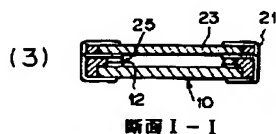


断面 I - I

【図 8】

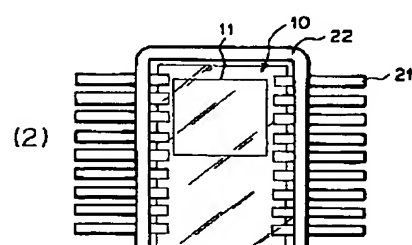
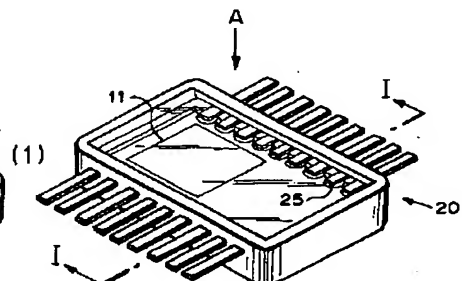


矢視 A

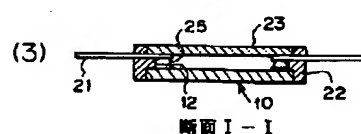


断面 I - I

【図 9】



矢視 A



断面 I - I

【図10】

